



RINSE

# Physical and mechanical control of *Crassula helmsii* and *Ludwigia peploides*. Is it a realistic option?

Johan van Valkenburg, INBO & Natuurmonumenten

Norwich, October 17th 2013



Reducing the Impact of  
Non-native Species in Europe  
[www.rinse-europe.eu](http://www.rinse-europe.eu)

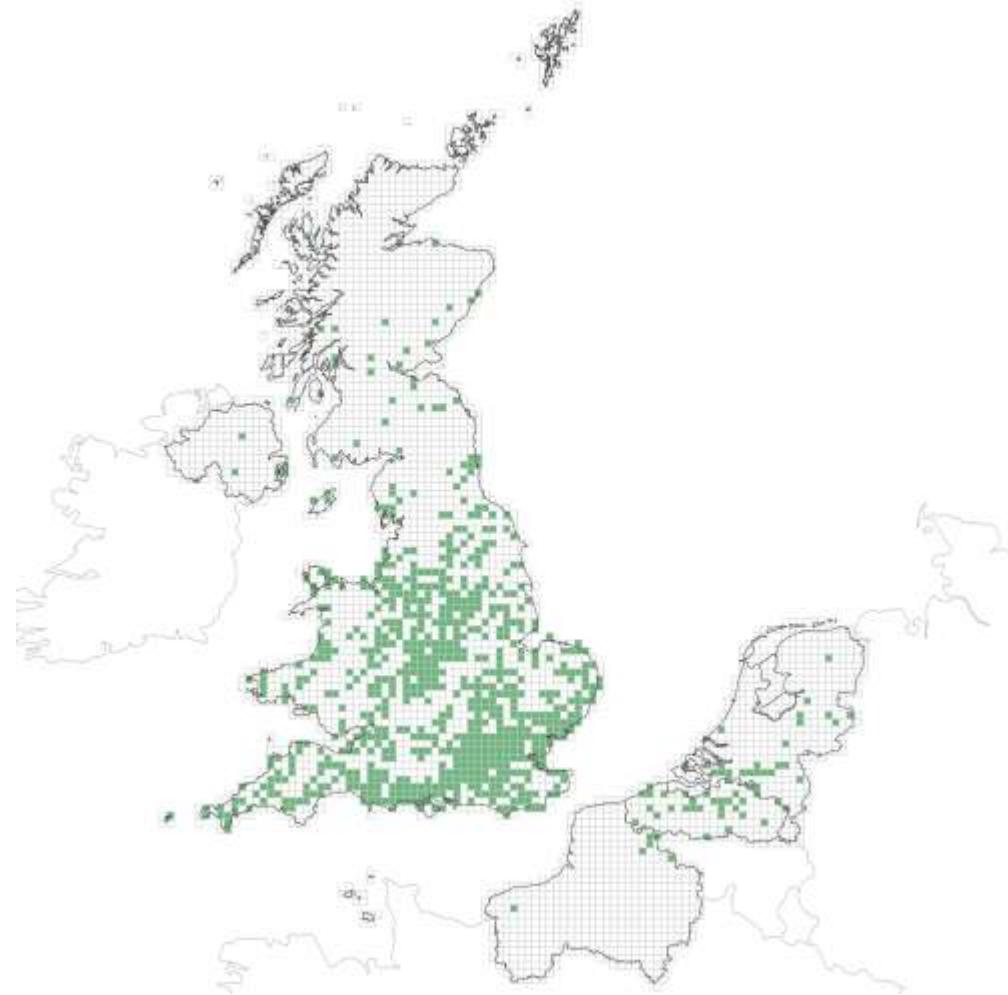
“Investing in your future”

Crossborder cooperation programme 2007-2013 Part-financed by the European Union (European Regional Development Fund)

# *Crassula helmsii*

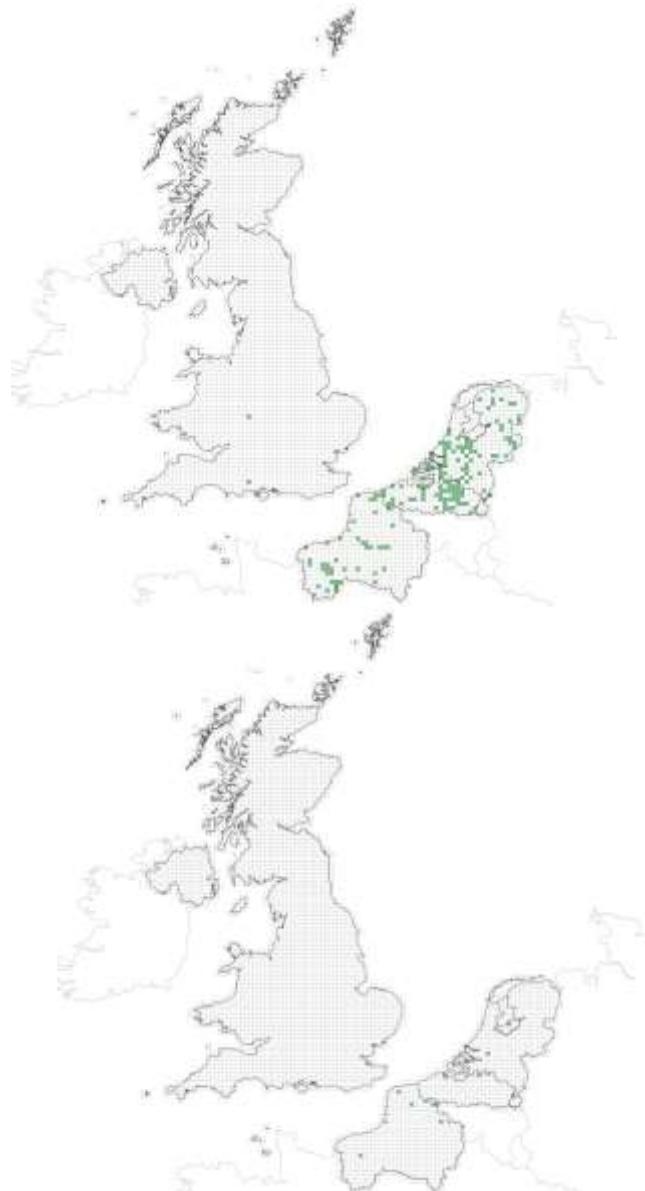


- Truly amphibic,
- Often overlooked
- Low nutrient levels (tolerance)
- Well established in UK
- Increasing fast in NL, B ( and FR?)



# *Ludwigia grandiflora* & *Ludwigia peploides*

- Both species posing the same problem, often misidentified
- High nutrient levels
- Recent arrival in UK (*L. grandiflora*)
- Well established NL, B & FR (*L. grandiflora*)
- Very limited NL, B, FR (*L. peploides*)



# Activities in NL prior to RINSE



**Q-bank Invasive Plants - Windows Internet Explorer**  
Dokumenten Bevörderung Seite Favoriten Extras Help  
q-bank.invasive plants

**INVASIVE PLANTS**

**Q-bank** COMPREHENSIVE DATABASES ON QUARANTINE PLANT PESTS AND DISEASES

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**Q-bank Invasive Plants database**

The invasive Plants database focuses on vascular plants (trees and bushes), with special attention to aquatic species because these plants cause acute and immediate damage to the environment comprising the Netherlands.

**Ludwigia grandiflora**

Calobroma caroliniana  
Hydrocotyle ranunculoides  
Lagarosiphon major  
**Ludwigia grandiflora**  
Nemedia guttata  
Myriophyllum aquaticum  
Vallisneria spiralis

LIB Field recognition card  
NL Risk assessment sheet  
Office guide  
Background information

Contact:

Dr. Jeroen van Valkenburg  
[j.c.vanvalkenburg@ewi.tue.nl](mailto:j.c.vanvalkenburg@ewi.tue.nl)  
Curator Invasive Plants database  
Phytosanitary expert  
National Reference Centre, Netherlands Food and Consumer Product Safety Authority (NVWA) the Netherlands

[http://www.q-bank.eu/Plants/ControlSheets/Ludwigia\\_State-of-the-Art.pdf](http://www.q-bank.eu/Plants/ControlSheets/Ludwigia_State-of-the-Art.pdf)

Start Microsoft Office... Prima Terminal 2... Microsoft PowerP... Microsoft Word Q-bank invasive... Quick Launch Min documents Internet 100% 13:34

# Activities in NL prior to RINSE EUPHRESCO DeCLAIM



**Ludwigia grandiflora (Michx.) Greuter & Burdet**

**Field Recognition Guide**

**Preferred habitat:** static shallow water-courses, ponds, ditches, with gently sloping muddy margins. Dead stems are visible in winter with green growth starting in March or early April. Flowers from July onwards.

**Key features:** Deltoid (triangular) bracteoles at base of petiole. Prostrate form: leaves alternate on stem, oval in shape with distinct petiole and obvious opposite veins. Adventitious roots at nodes. Upright form: Leaves alternate on stem, elongated with obvious opposite veins. Flowers bright yellow 5 with petals.

**Reporting:** please inform the Non Native Species Secretariat at [www.invasive-species.org](http://www.invasive-species.org) giving grid reference, extent of infestation, photograph and date of observation, and the Biological records centre at <http://www.brc.ac.uk/contact.htm>

**Further action:** Assess the risk of the population you have observed using the risk assessment sheet provided in this pack.

**Areas at Risk of Colonisation** In the UK, *L. grandiflora* has been found in low lying ponds adjacent to the coast. However, there are several sites where it has been deliberately planted as an ornamental. It is tolerant of British winter temperatures and its occurrence is predicted to be widespread in ponds anywhere at low altitudes.

*Ludwigia grandiflora (Michx.) Greuter & Burdet*

A guide to Identification, Risk Assessment and Management



© S. Hathaway

Plant Protection Service, Wageningen, NL  
Centre for Ecology and Hydrology - Wallingford, UK  
June 2011

# Field guide invavise aquatics NL / INVE XO project



## Target species of management trials

- *Hydrocotyle ranunculoides*
- *Myriophyllum aquaticum*
- *Ludwigia grandiflora*

*Crassula helmsii* part of communication project as such



Watervrascalla, Waternaaldkruid  
*Crassula helmsii* (Kirk) Cockayne  
(Crassulaceae)

**Kenmerken**

- vleesplant, komt ook half en grond  
ondergrondse voor
- bladgrootte 0,5-1,5 cm
- bladkleur groen - oranje
- jaar groen

**Groeiende soorten**

soortsoort, soortsoorten

	Watersoort	Verspreid.	Soortsoort
WRS	Veelal in verontreiniging voorkomend	Veelal voorkomend	Veelal voorkomend voornamelijk in rivieren
WdR	Veelal in verontreiniging voorkomend	Veelal voorkomend	Veelal voorkomend voornamelijk in rivieren
WdG	Veelal in verontreiniging voorkomend	Veelal voorkomend	Veelal voorkomend voornamelijk in rivieren
WdS	Veelal in verontreiniging voorkomend	Veelal voorkomend	Veelal voorkomend voornamelijk in rivieren

Watersoortsoorten: WRS = Waterrijke rivieren; WdR = Waterarme rivieren; WdG = Grotewater; WdS = Stilstaande wateren.

### Aanval-verbreiding

Beste enkele kegels oosten.

### Heilicosis

Assen, Noord-Holland.

### Biologie

Watervrascalla vermaakt dode vegetatie op water en in onder water. Hierbij wordt de bodem volledig bedekt. Watervrascalla heeft een hoge ecologische waarde en kan in vergadering zijn de enige andere invasieve waterplant die voorkomt in waterstaat moeras. Watervrascalla is wintergroen. Verplanting gebruikt deze hoge groei en verminderingskracht.

### Biotopsafing

Watervrascalla kan een zeer diepe vegetatie veroorzaken en in moeraslanden water. Hierdoor wordt het een ernstige bedreiging voor lokale flora en fauna. Aangezien ook voor lokale biotoopsoorten veel invloed van invasie is bestrijding erg belangrijk.

### Borrelijking

De volledig mogelijk borreljuk. Zet water deels verarmen achter op de kalk-stenen die lig locaties verduurzaamt. Progressieve in voorbeulen en ruiting is noodzakelijk.



# Information on Q-bank fact sheets



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**Crassula helmsii (Kirk) Cockayne** - Rien. Crassulaceae  
Australian swamp stonecrop, New Zealand pygmyweed  
Reproduces : Rhizome (rhizot. Kirk), Z. resupinata (Heckel), Hechtia gracilis (Lam.) Stev., *Crassula recurvata* (Jacq.) Stev.  
Ecology : Australian swamp stonecrop forms dense mats of vegetation on banks and in shallow water. Australian swamp stonecrop has a very wide ecological amplitude and occurs, unlike other invasive aquatic plants, in nutrient-poor environments. The species is emergent. It is dispersed by small fragments and turions. In the Netherlands Australian swamp stonecrop is found mainly in ponds and ditches.  
Threat : Australian swamp stonecrop can form a very dense mat of vegetation on banks and in nutrient-poor watercourses. This density reduces abundance of indigenous flora and fauna. The plant requires only a very small fragment to survive and grows very rapidly.  
Control : Remove plants as quickly as possible. Tiny fragments can regrow on soil. Remove all rhizomes and roots. Avoid the use of chemicals. Instead, use hand weeding of treated areas. Dipping up the plant and covering with light-blocking cloth for one week kills most water-mimic protonemal protonoids. Material and sheet should be thoroughly cleaned after being in an area infested with this plant to avoid further spread.  
Identification / similar species : Australian swamp stonecrop is similar to pearlwort (*Sagina* spp.) and water-starwort (*Callitrichia* spp.). The stem of this plant is usually white to red and the flower has 4 corolla leaves (pearlwort 5, rarely 4; water-starwort with tiny flowers without corolla leaves).  
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**Identification / similar species :** Australian swamp stonecrop is similar to pearlwort (*Sagina* spp.) and water-starwort (*Callitrichia* spp.). The stem of this plant is usually white to red and the flower has 4 corolla leaves (pearlwort 5, rarely 4; water-starwort with tiny flowers without corolla leaves).

**Identification / espèces similaires :** Les stipules de la Jussie fausse-pépilde sont rondes à ovales et gonflées, alors que celles de la Jussie à grandes fleurs sont triangulaires, étroites et plates. De plus, les anthères de la Jussie faussepépilde mesurent 1 à 1,8 mm et celles de la Jussie à grandes fleurs 2 à 3 mm.

**Ludwigia peploides (Wendt) P.H. Raven** - Famille : Onagracées  
Jussie fausse-pépilde  
Reproduces : Jusqu'à 1000 graines par plante. Anémocoïne (dispersion par le vent).  
Ecologie : Généralement, la Jussie fausse-pépilde s'accommode de toute eau douce (eau douce, marécage, lac, étang, rivière, etc.). La Jussie fausse-pépilde est sujet à une auto-hémiotropie et une semence peut produire des graines.  
Danger : La Jussie fausse-pépilde peut régurgiter dans l'eau et sur les rives. La régurgitation bactérienne peut faire entrer à la circulation de l'eau et réduire la qualité et l'origine de l'eau.  
Contrôle : Il convient de retirer la Jussie fausse-pépilde le plus rapidement possible et il faut éviter la remise en eau. Il faut également éteindre la feuille.  
Identification / espèces similaires : Les feuilles de la Jussie fausse-pépilde sont rondes à ovales et gonflées, alors que celles de la Jussie à grandes fleurs sont triangulaires, étroites et plates. De plus, les anthères de la Jussie faussepépilde mesurent 1 à 1,8 mm et celles de la Jussie à grandes fleurs 2 à 3 mm.

# *Ludwigia* a brief history for NL



- First record *L. grandiflora* as invasive 2000
- First record *L. peploides* as invasive 2007  
→ approval for eradication action in nature restoration project

# Verification November 2007



# Verification November 2007



# Verification November 2007



# Eradication November 2007





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## Mangement advice

- Topsoil removal to a depth of 10 – 30 cm and contaminated soil to be stockpiled
- Emergent creeping vegetation marked and the soil excavated to a depth of 30 cm
- Drainage of ditches prior to excavation
- Holes to be dug at the site in areas where no *L.peploides* is present, and contaminated topsoil with fragments and plants to be buried at least 1 m deep.
- Reprofiling ditches and margins after removal

# Eradication November 2007



# Eradication November 2007



# Eradication November 2007



# Eradication November 2007



# Eradication November 2007



# Follow-up Biesbosch 2008-2009

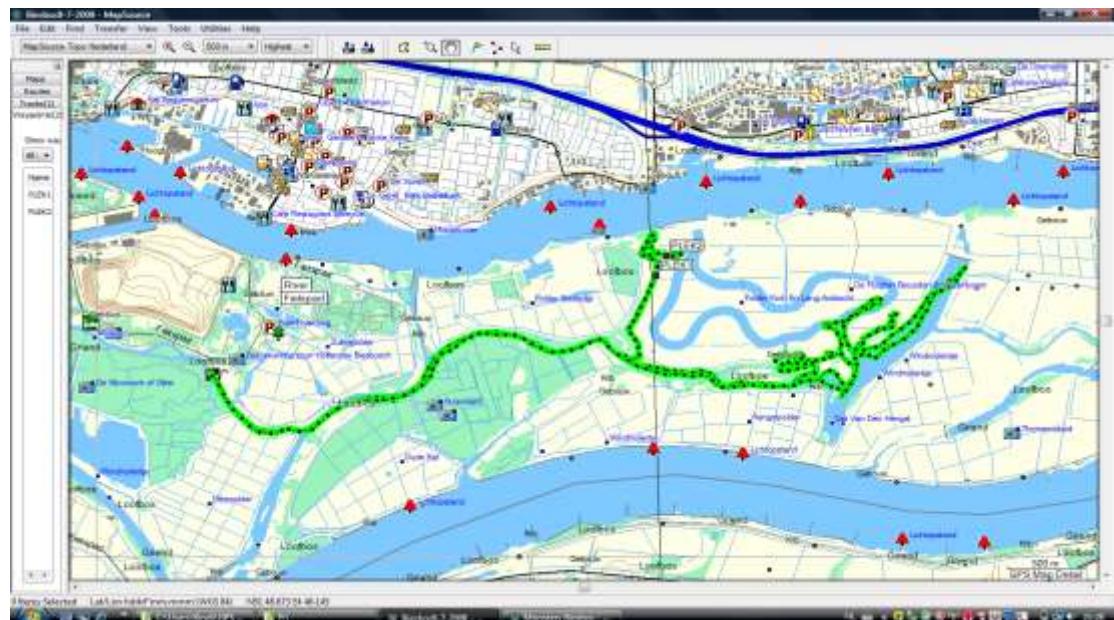


Databladveld fyntbewerking

	L. pectinoides	L. grandiflora
Steunblaadjes	Rond tot oval, gekwelde	Driehoekig, dun en plat
Bladeren op bloeiende stengel	Duidelijke blaadsteel en bladzijde	Bladsteel afwezig

In deze mapgegevens. Rechtstreeks naar de relevante locatie bij de Plantenbeschrijvingen. Directe download mogelijk.  
Klik op deze pagina nog zonder voorafgaande toestemming van degenen die dit op de gegeven wijze worden overdoen, openbaar gemaakte of voor commerciële doeleinden worden gebruikt.

ingangscode: 14-9-2008  
Pagina 2 van 2





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Bestrijding kleine waterteunisbloem op Tiengemeten | Natuurmonumenten - Mozilla Firefox

Bestand Registratie Veld geschiedenis Slideshow Extra Help

Bestrijding kleine waterteunisbloem op Tiengemeten

natuurmonumenten.nl/bestrijding-kleine-waterteunisbloem-op-tiengemeten

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NATUURGEBIED

Tiengemeten

Speelnatuur Hollands dagje uit De Wildernis in Tickets & Tijden Overzicht Tiengemeten

NIEUWS

Bestrijding kleine waterteunisbloem op Tiengemeten

02 okt 2012, 14:50

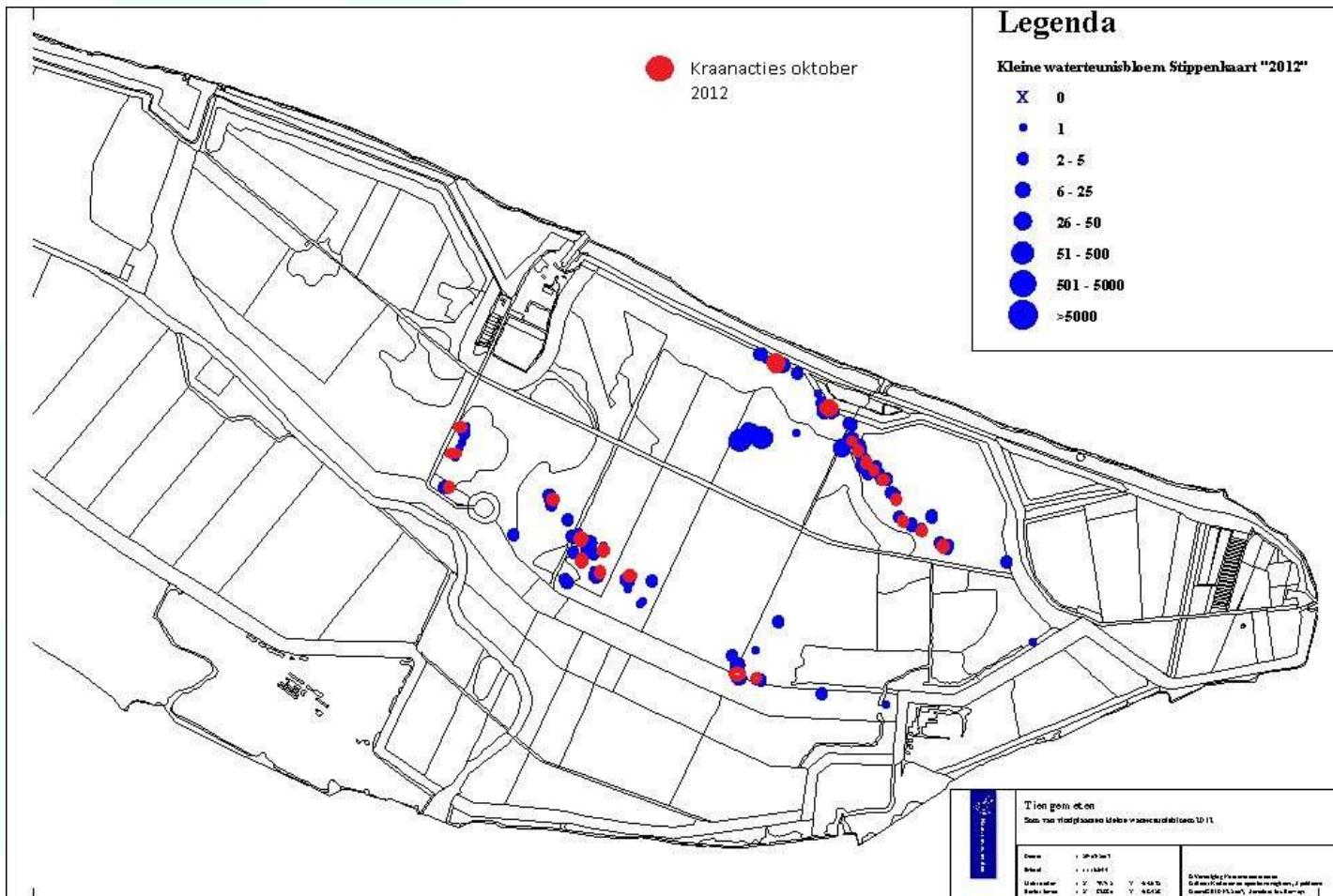
Op Tiengemeten is de kleine waterteunisbloem (*Ludwigia peploides*) aangetroffen. Deze soort komt van nature niet in Nederland voor, kan zich explosief ontwikkelen en kan een bedreiging vormen voor inheemse soorten. Daarom neemt Natuurmonumenten maatregelen om verdere verspreiding van deze invasieve soort te voorkomen.

Investeringen in bestrijding

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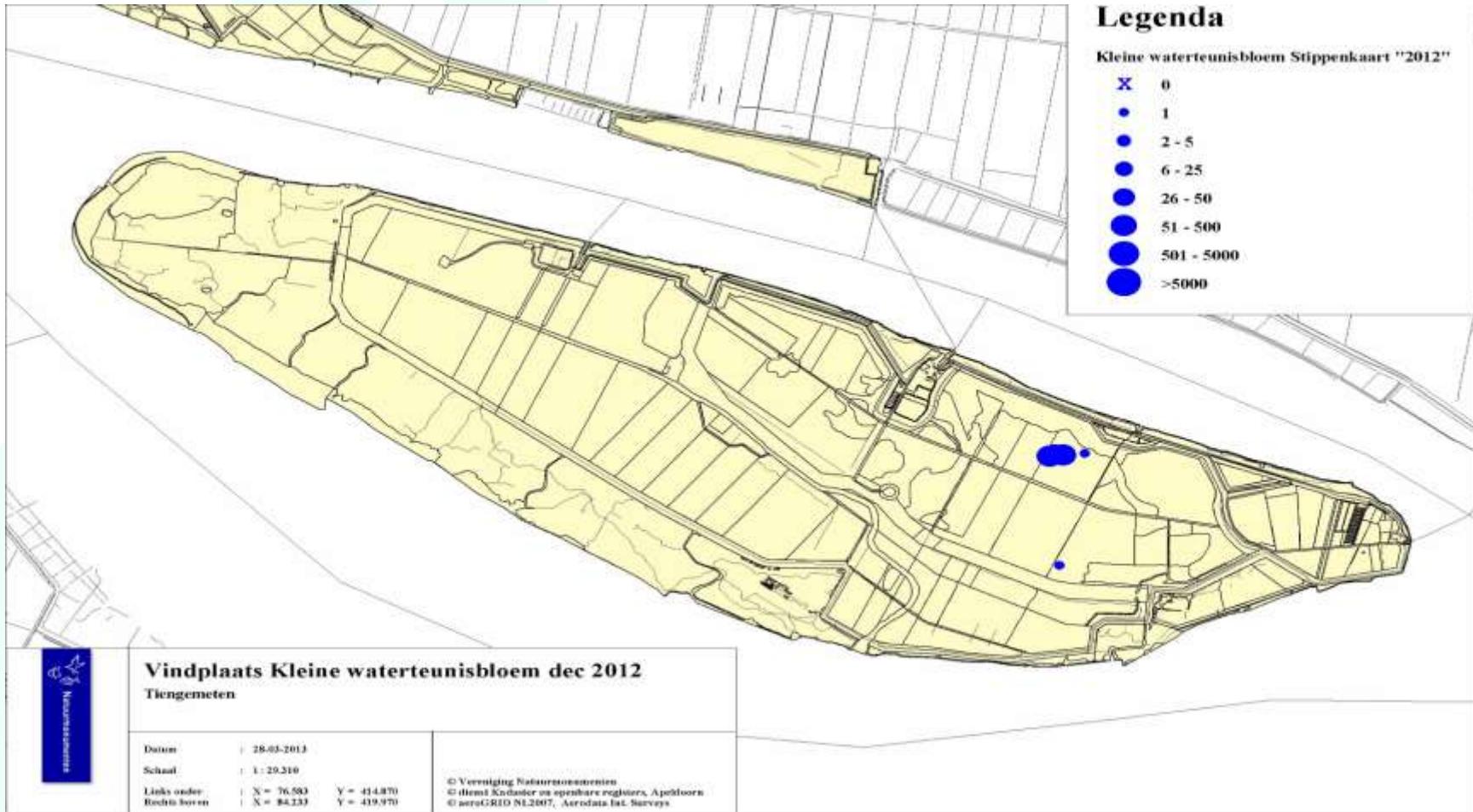
# Distribution 2012



# Tiengemeten 2012 nature restoration project



# December 2012 survey



# Mechanical and manual actions 2013



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# Mechanical and manual actions 2013



# Mechanical and manual actions 2013

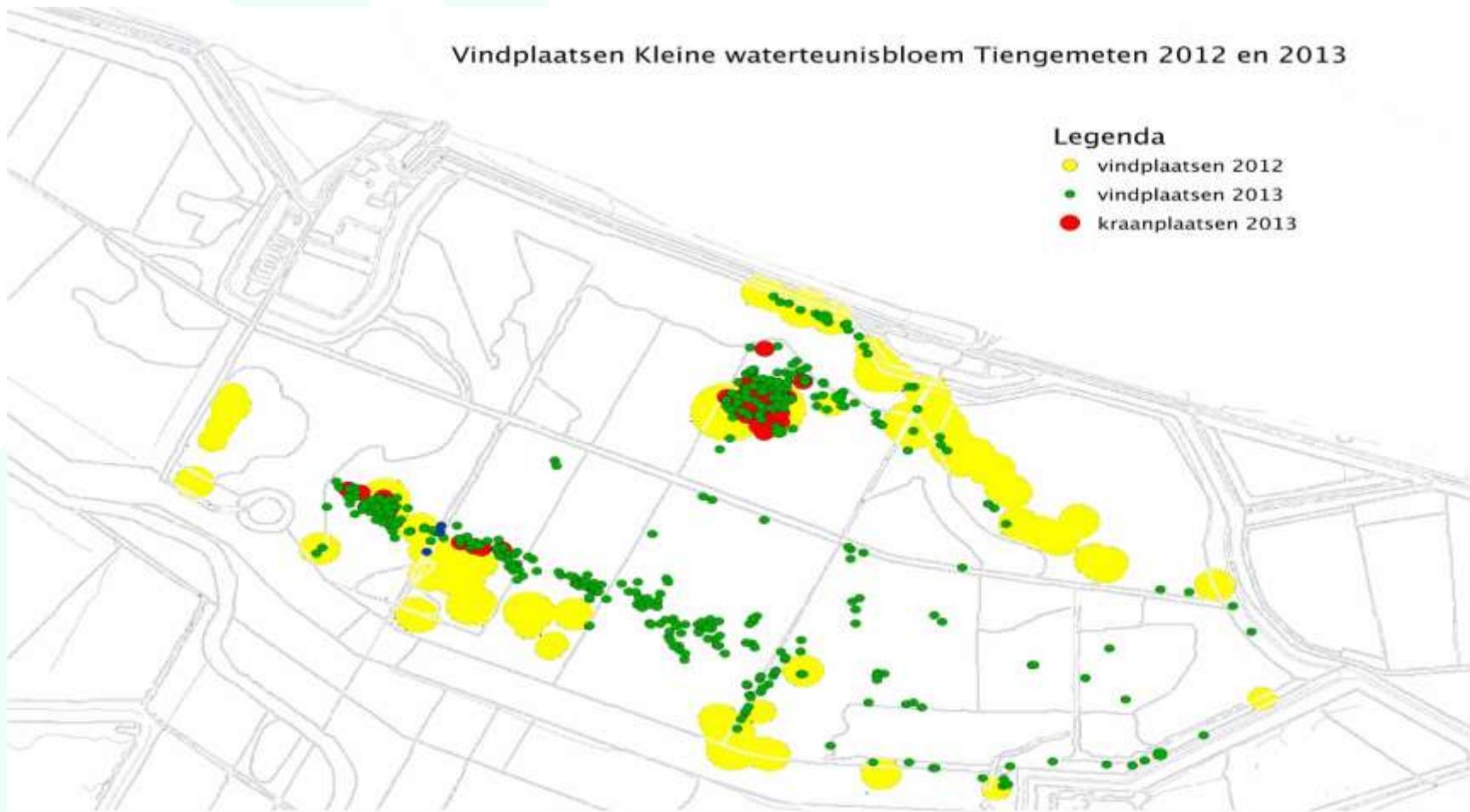


# Facilitators of establishment

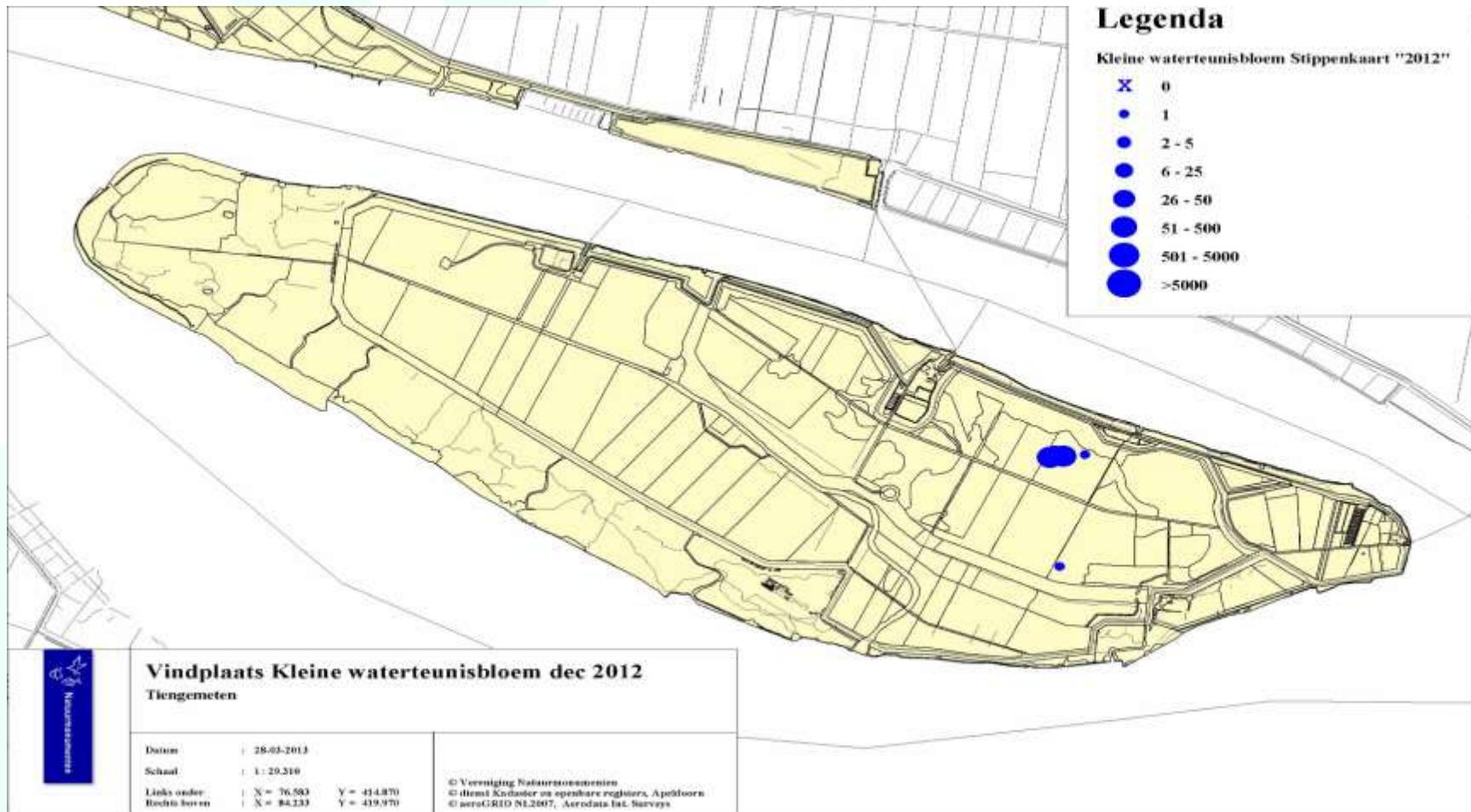




# Results 2013 survey regrowth treated sites and new infestations



# December 2012 survey



# Financial aspects of actions



	2012	2013
<b>Excavator</b>	€ 3.400	€ 1.700
<b>Amphibic excavator</b>		€ 9.400
<b>Materials</b>		€ 300
<b>Employees</b>	160 hours	252 hours
<b>Volunteers</b>	60 hours	414 hours

# *Crassula* a brief history for NL



- First record in 1995
- Reluctance to act in the absence of impact on drainage systems
- Gradual acknowledgement as a problem for nature restoration projects, dune valleys also susceptible.
- Increasing presence in ponds for conservation of amphibians

# First involvement Noordenveld nature restoration project





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Bestrijding hardnekkig woeckerende watercrassula | Natuurmonumenten - Mozilla Firefox

Bestand Registratie Webs geschiedenis Bladeren Eigte Help

Bestrijding hardnekkig woeckerende watercrassula

natuurmonumenten.nl/research/bestrijding-hardnekkig-woeckerende-watercrassula

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Over dit natuurgebied Activiteiten Routes Wandelingen Dieren en planten Projecten Nieuws Info en contact

NIEUWS

Bestrijding hardnekkig woeckerende watercrassula

15 okt 2012, 15:59

NATUURMONUMENTEN STRIJDTEGEN WATERPLANT OM ANDERE SOORTEN TE REDDEN

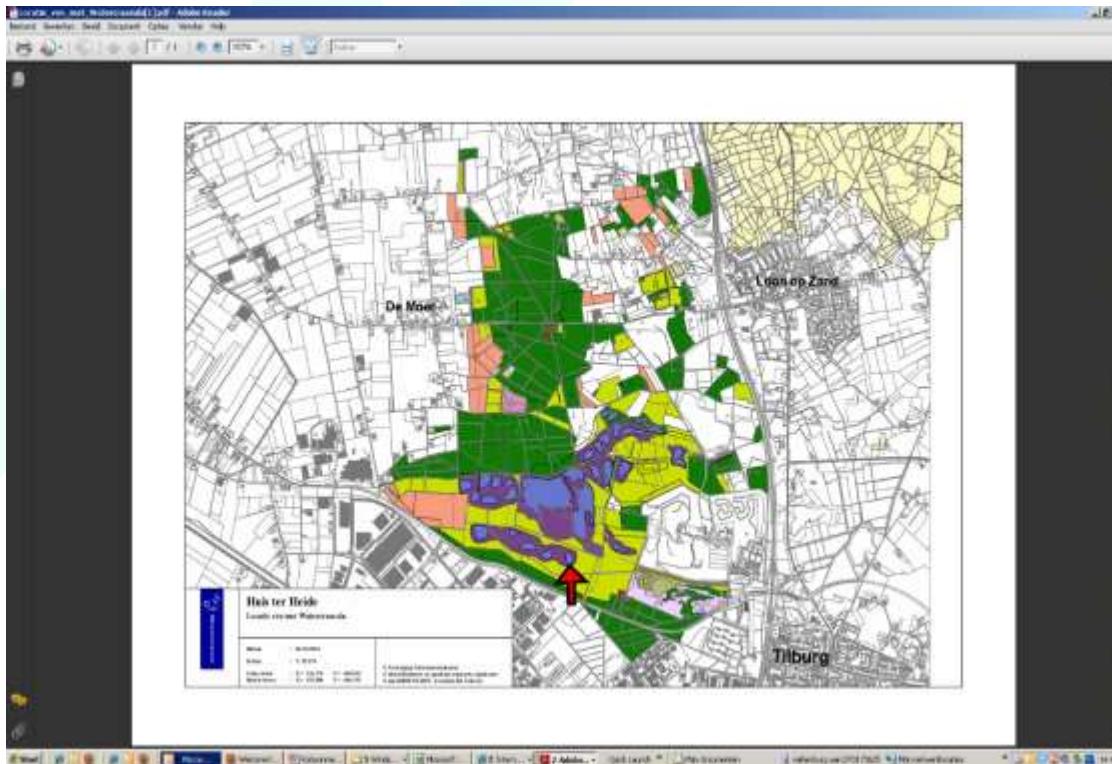
Watercrassula maakt ander leven onmogelijk Dit waterplantje, ook wel waternaaldkruid genoemd, groeit zo snel, dat het binnen korte tijd alle andere water- en oeverplanten verstuift. Het is geworden in een van de Vossenbergsse vennen in

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# *Crassula helmsii* at Huis ter Heide



- June 2012 request for management advice by Erwin de Hoop



# Site visit June 2012



# Site visit June 2012



# Observations June 2012



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- Scattered plants on dry land
- Varying levels of infestation on the periodically flooded pools
- Massive infestations on the bank of the large pond
- Probably present at greater depth
- All infestations at some time of the year connected with the large pond

# Advice based on visit June



- Containment of the infestation
- Exclude grazers from the site
- Start draining the pond
- Remove topsoil upper 20 cm
- Burry contaminated soil on site

# July 2012 pump at full swing



# July 2012 effect of drainage



# Status activities end of July 2012



- After weeks of pumping minimal achievable depth has been reached due to pressure from groundwater
- At centre of pond still 50 cm depth
- Start of removal of 20 cm topsoil on drained pond and dry land areas

# Visit August 2012



- Topsoil removed off exposed pond bottom
- Water level rising
- Topsoil removed from originally delimited areas
- Additional surveys initiated



# Visit August 2012



# Status of the project August 2012



- 3400 cubic meters of soil removed
- Still 1200 cubic meters to go
- Remnant population at the bottom of the lake is a permanent source of propagules
- Application of dye becomes an option to consider

# October 2012



- Volunteers involved in survey of all new ponds
- Administrative search to obtain permission for application of dye initiated
- New sightings at 2 additional ponds
- INBO on board to monitor vegetation development



# Visit October 9 2012



# Visit October 9 2012



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# Recommendations & follow up



- Bare banks of the pond to be covered in ‘plastic’
- Monitoring plots to be established
- New infestations to be signalled and removed or isolated
- Surveying fragments that wash ashore

# Oktober - November 2012



# Financial aspects of actions

Some figures so far (December 2012)

- Draining, scraping, burying € 55.000
- 1500 m of fabric (4 m wide) € 5.500
- 750 m of fencing material € 1.500
- Staff time Natuurmonumenten & volunteers (877 hours) € 21.000
- Dye (30 kg) € 600
- Staff time INBO p.m.
- Staff time NVWA p.m.

# January 2013



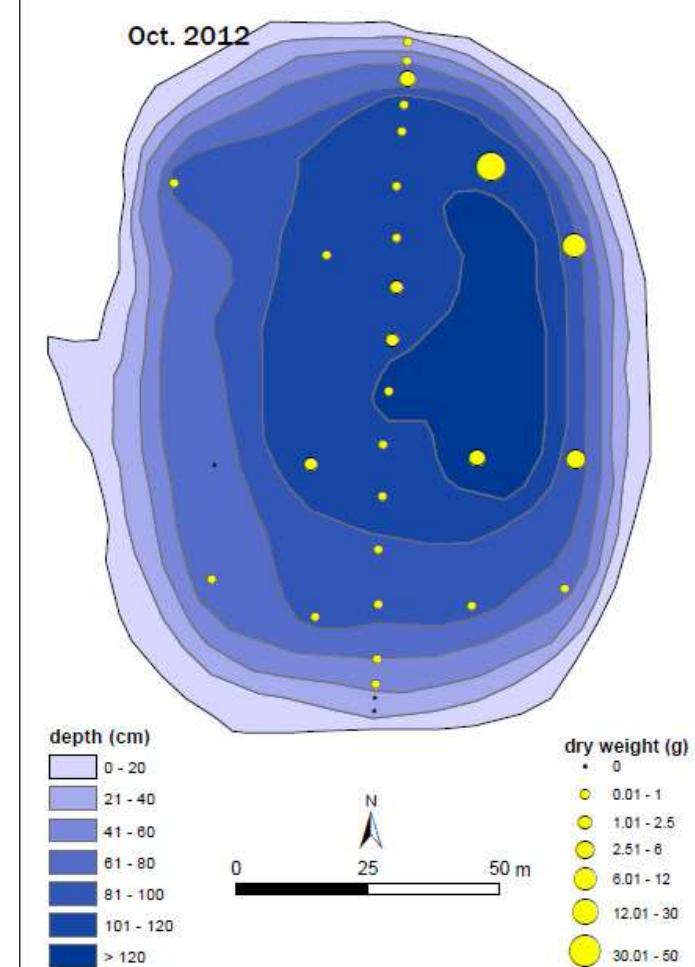
- Water level rising above initial covered surface
- Fragments washing ashore
- Volunteers cleaning shores every week



# Application of dye 2013



- First application  
January 16 kg
- Pond c. 150 m across
- Central part 150 cm  
deep



# Application of dye 2013



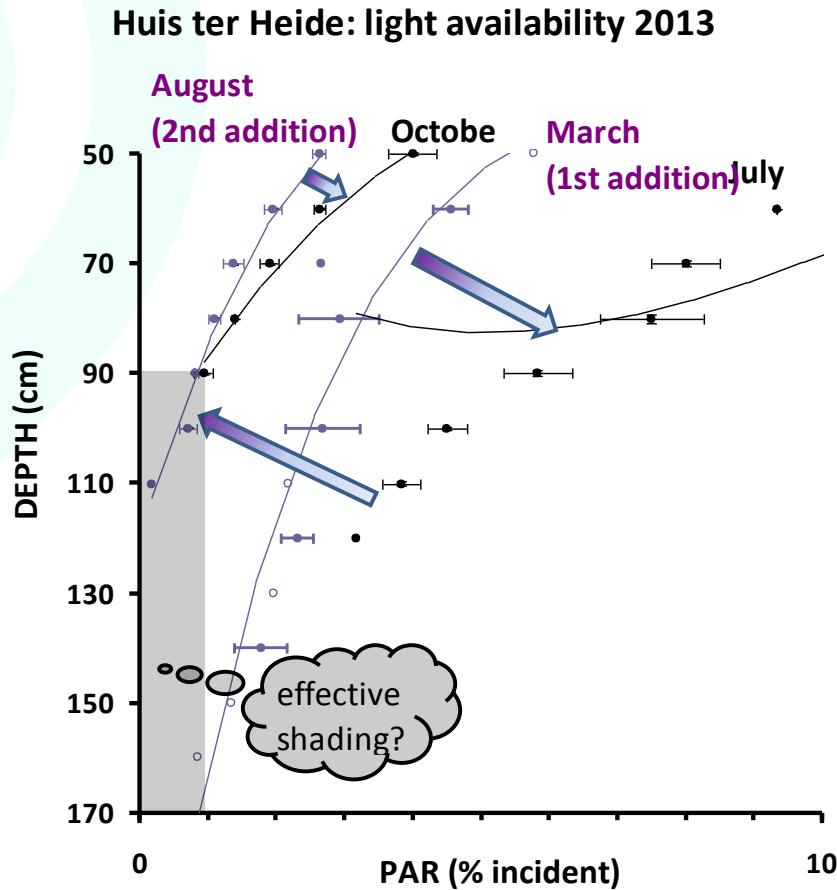
- Topping up March 14 kg
- 2nd load 30 kg August



# State-of-the-art autumn 2013



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# Volunteer actions 2nd & 3rd pond



# October surprises



# Financial aspects of actions 2013



- Costs of dye € 1200
  - Volunteers 482 days
  - Staff time 95 days
  - Staff NVWA p.m.
  - Staff INBO p.m.
- 
- Natuurmonumenten >4600 hours

# Every method tested



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# Is it feasible?



*Ludwigia peploides*:

- Yes with stamina and preferably at an early stage of infestation (2nd year)

*Crassula helmsii*:

- Only with extreme sanitary measures in dry land areas
- Scale dependant
- In amphibic situations highly problematic
- Prepare for a serious battle (if you see a little there is far more!!)
- Management guidance document in preparation



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# Special thanks to:

- Astrid Withagen, Esther Dijkstra, Menno van Zuijen (Natuurmonumenten – Beheereenheid Haringvliet / Krammer Volkerak) & all volunteers
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